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# Newcastle Reservoir Iron County, Utah

National Eutrophication Survey, Corvallis, Oreg

Prepared for

Corvallis Environmental Research Lab, Oreg

Sep 77

PB 281 874

# U.S. ENVIRONMENTAL PROTECTION AGENCY
# NATIONAL EUTROPHICATION SURVEY

## WORKING PAPER SERIES

**CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON**

**and**

**ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA**

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# REPORT
# ON
# NEWCASTLE RESERVOIR
# IRON COUNTY
# UTAH
# EPA REGION VIII
# WORKING PAPER No. 849

WITH THE COOPERATION OF THE
UTAH STATE DIVISION OF HEALTH
AND THE
UTAH NATIONAL GUARD
SEPTEMBER, 1977

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
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# FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

## OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

## ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

## LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Utah Department of Social Services and the Utah Department of Natural Resources for professional involvement, to the Utah National Guard for conducting the tributary sampling phase of the Survey, and to those Utah wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

The staffs of the Bureau of Water Quality of the Division of Health and the Division of Wildlife Resources provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

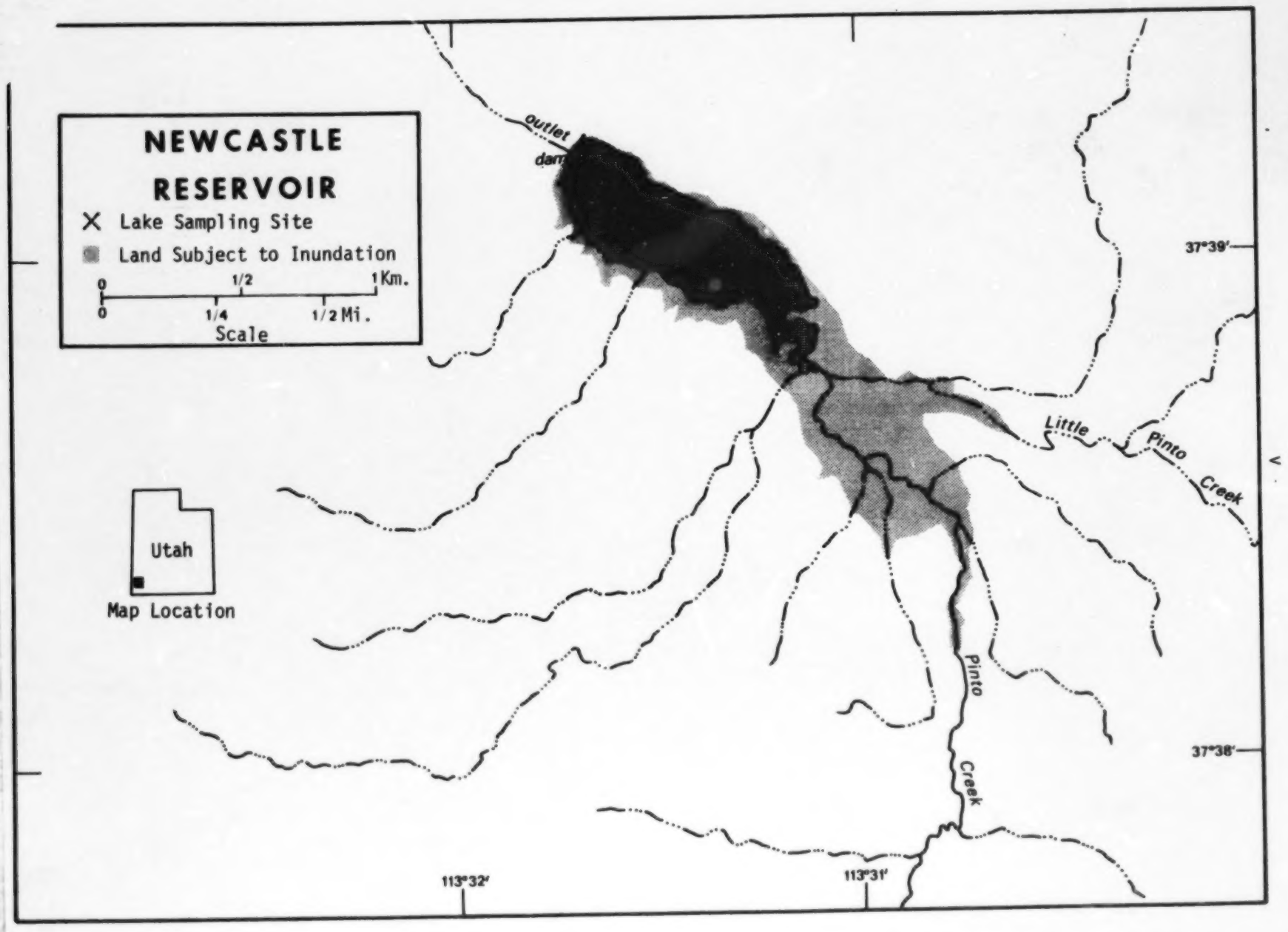
Major General Maurice L. Watts, the Adjutant General of Utah, and Project Officer Lt. Colonel T. Ray Kingston, who directed the volunteer efforts of the Utah National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

# NATIONAL EUTROPHICATION SURVEY

## STUDY LAKES AND RESERVOIRS

### STATE OF UTAH

| NAME | COUNTY |
|---|---|
| Bear | Rich, UT; Bear Lake, ID |
| Deer Creek | Wasatch |
| Echo | Summit |
| Fish | Sevier |
| Flaming Gorge | Daggett, UT; Sweetwater, WY |
| Huntington | Emery |
| Joes Valley | Emery |
| Lower Bowns | Garfield |
| Lynn | Box Elder |
| Minersville | Beaver |
| Moon | Duchesne |
| Navajo | Kane |
| Newcastle | Iron |
| Otter Creek | Piute |
| Panguich | Garfield |
| Pelican | Uintah |
| Pineview | Weber |
| Piute | Piute |
| Porcupine | Cache |
| Powell | Garfield, Kane, San Juan, UT; Coconino, AZ |
| Pruess | Millard |
| Sevier Bridge | Juab, Sanpete |
| Starvation | Duchesne |
| Steinaker | Uintah |
| Tropic | Garfield |
| Utah | Utah |
| Willard Bay | Box Elder |


NEWCASTLE
RESERVOIR
Lake Sampling Site
Land Subject to Inundation
0
1/2
1 Km.
0
1/4
1/2 Mi.
Scale
Utah
Map Location
Outlet
dam
Little
Pinto
Creek
Pinto
Creek
37°39'
37°38'
113°32'
113°31'

# NEWCASTLE RESERVOIR

## STORET NO. 4912

## I. INTRODUCTION

Newcastle Reservoir was included in the National Eutrophication Survey as a water body of interest to the Utah Bureau of Environmental Health. Tributaries and nutrient sources were not sampled, and this report relates only to the lake sampling data.

## II. CONCLUSIONS

### A. Trophic Condition:

Survey data indicate that Newcastle Reservoir is eutrophic. It ranked fifteenth in overall trophic quality when the 27 Utah lakes and reservoirs sampled in 1975 were compared using a combination of six parameters*. Twenty of the water bodies had less median total phosphorus, 18 had less and one had the same median orthophosphorus, none had less and ten had the same median inorganic nitrogen, 19 had less mean chlorophyll a, and 14 had greater mean Secchi disc transparency. Significant depression of dissolved oxygen with depth occurred in August (1.4 mg/l at 9.4 meters).

Survey limnologists noted an algal bloom in progress in May.

### B. Rate-Limiting Nutrient:

Because of nutrient changes in the samples, the algal assay results are not considered representative of conditions in the reservoir at the times the samples were taken. The reservoir data indicate nitrogen limitation in May and August and phosphorus limitation in September.

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* See Appendix A.

## III. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

### A. Morphometry††:

1. Surface area: 0.66 kilometers$^2$.
2. Mean depth: 7.2 meters.
3. Maximum depth: 23.5 meters.
4. Volume: 4.736 x $10^6$ m$^3$.

### B. Precipitation*:

1. Year of sampling: 33.8 centimeters.
2. Mean annual: 26.2 centimeters.

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† Table of metric conversions--Appendix B.
†† Sudweeks, 1975; maximum depth from Ikner (1975).
* See Working Paper No. 175, "...Survey Methods, 1973-1976".

## IV. WATER QUALITY SUMMARY

Newcastle Reservoir was sampled three times during the open-water season of 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at a single station on the reservoir (see map, page v). During each visit, a depth-integrated (4.6 m to surface) sample was collected for phytoplankton identification and enumeration; and a similar sample was taken for chlorophyll a analysis. During the first and last visits, an 18.9-liter depth-integrated sample was collected for algal assays. The maximum depth sampled was 9.4 meters.

The sampling results are presented in full in Appendix C and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR NEWCASTLE RESERVOIR
STORET CODE 4912

| PARAMETER | 1ST SAMPLING ( 5/ 8/75) 1 SITES RANGE | MEAN | MEDIAN | 2ND SAMPLING ( 8/13/75) 1 SITES RANGE | MEAN | MEDIAN | 3RD SAMPLING ( 9/26/75) 1 SITES RANGE | MEAN | MEDIAN |
|---|---|---|---|---|---|---|---|---|---|
| TEMP (C) | 9.8 - 11.3 | 10.2 | 9.9 | 18.0 - 21.3 | 20.3 | 21.0 | 17.8 - 18.5 | 18.1 | 18.1 |
| DISS OXY (MG/L) | 9.2 - 9.2 | 9.2 | 9.2 | 1.4 - 8.2 | 4.8 | 4.8 | 7.0 - 8.4 | 7.5 | 7.3 |
| CNDCTVY (MCROMO) | 613. - 630. | 621. | 621. | 495. - 596. | 559. | 573. | 528. - 538. | 534. | 535. |
| PH (STAND UNITS) | 8.6 - 8.6 | 8.6 | 8.6 | 8.0 - 8.6 | 8.3 | 8.3 | 8.4 - 8.5 | 8.5 | 8.5 |
| TOT ALK (MG/L) | 248. - 258. | 255. | 257. | 180. - 186. | 183. | 182. | 192. - 196. | 194. | 195. |
| TOT P (MG/L) | 0.071 - 0.079 | 0.074 | 0.072 | 0.034 - 0.064 | 0.048 | 0.046 | 0.033 - 0.045 | 0.040 | 0.040 |
| ORTHO P (MG/L) | 0.041 - 0.050 | 0.044 | 0.042 | 0.007 - 0.040 | 0.016 | 0.009 | 0.002 - 0.005 | 0.003 | 0.003 |
| NO2+NO3 (MG/L) | 0.020 - 0.020 | 0.020 | 0.020 | 0.020 - 0.020 | 0.020 | 0.020 | 0.020 - 0.020 | 0.020 | 0.020 |
| AMMONIA (MG/L) | 0.020 - 0.030 | 0.022 | 0.020 | 0.020 - 0.040 | 0.030 | 0.030 | 0.020 - 0.040 | 0.025 | 0.020 |
| KJEL N (MG/L) | 0.300 - 0.800 | 0.425 | 0.300 | 0.600 - 0.700 | 0.650 | 0.650 | 0.400 - 0.500 | 0.425 | 0.400 |
| INORG N (MG/L) | 0.040 - 0.050 | 0.042 | 0.040 | 0.040 - 0.060 | 0.050 | 0.050 | 0.040 - 0.060 | 0.045 | 0.040 |
| TOTAL N (MG/L) | 0.320 - 0.420 | 0.445 | 0.320 | 0.620 - 0.720 | 0.670 | 0.670 | 0.420 - 0.520 | 0.445 | 0.420 |
| CHLRPYL A (UG/L) | 16.1 - 16.1 | 16.1 | 16.1 | 5.7 - 5.7 | 5.7 | 5.7 | 15.6 - 15.6 | 15.6 | 15.6 |
| SECCHI (METERS) | 0.9 - 0.9 | 0.9 | 0.9 | 3.0 - 3.0 | 3.0 | 3.0 | 1.5 - 1.5 | 1.5 | 1.5 |

B. Biological Characteristics:

1. Phytoplankton -

| Sampling Date | Dominant Genera | Algal Units per ml |
|---|---|---|
| 05/08/75 | 1. Stephanodiscus sp. | 6,117 |
| | 2. Nitzschia sp. | 1,001 |
| | 3. Chroomonas sp. | 278 |
| | 4. Glenodinium sp. | 56 |
| | 5. Schroederia sp. | 56 |
| | Total | 7,508 |
| 08/13/75 | 1. Elakatothrix sp. | 1,771 |
| | 2. Cyclotella sp. | 227 |
| | 3. Oocystis sp. | 91 |
| | 4. Endorina sp. | 45 |
| | Total | 2,134 |
| 09/26/75 | 1. Asterionella sp. | 3,798 |
| | 2. Oocystis sp. | 1,825 |
| | 3. Fragilaria sp. | 831 |
| | 4. Synedra sp. | 592 |
| | 5. Aphanizomenon sp. | 543 |
| | Other genera | 1,043 |
| | Total | 8,632 |

2. Chlorophyll a -

| Sampling Date | Station Number | Chlorophyll a (µg/l) |
|---|---|---|
| 05/08/75 | 1 | 16.1 |
| 08/13/75 | 1 | 5.7 |
| 09/26/75 | 1 | 15.6 |

C. Limiting Nutrient Study:

Significant nutrient changes occurred in the assay samples during shipment from the field to the laboratory, and the results

are not considered representative of conditions in the reservoir at the times the samples were taken (05/08/75 and 09/26/75).

The reservoir data indicate nitrogen limitation in May and August and phosphorus limitation in September (the mean inorganic nitrogen/dissolved orthophosphorus ratios were 1/1, 3/1, and 15/1, respectively).

## V. LITERATURE REVIEWED

Ikner, James, 1975. Personal communication (reservoir morphometry). U.S. Geol. Surv., Salt Lake City.

Sudweeks, Calvin K., 1975. Personal communication (reservoir morphometry). UT Bur. of Env. Health, Salt Lake City.

# VI. APPENDICES

## APPENDIX A

## LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

| LAKE CODE | LAKE NAME | MEDIAN TOTAL P | MEDIAN INORG N | 500-MEAN SEC | MEAN CHLORA | 15-MIN DO | MEDIAN DISS ORTHO P |
|---|---|---|---|---|---|---|---|
| 0408 | LAKE POWELL | 0.010 | 0.410 | 339.830 | 3.081 | 13.800 | 0.007 |
| 4901 | BEAR LAKE | 0.011 | 0.040 | 253.167 | 0.945 | 9.200 | 0.003 |
| 4902 | LOWER BOWN'S RESERVOIR | 0.031 | 0.040 | 336.000 | 5.567 | 9.400 | 0.006 |
| 4903 | DEER CREEK RESERVOIR | 0.038 | 0.215 | 430.333 | 9.078 | 14.800 | 0.006 |
| 4904 | ECHO RESERVOIR | 0.047 | 0.170 | 450.333 | 6.967 | 14.000 | 0.012 |
| 4905 | LYNN RESERVOIR | 0.121 | 0.200 | 417.667 | 39.600 | 10.400 | 0.052 |
| 4906 | FISH LAKE | 0.023 | 0.040 | 152.000 | 12.483 | 10.400 | 0.004 |
| 4907 | HUNTINGTON NORTH RESERVO | 0.013 | 0.040 | 392.000 | 1.900 | 7.800 | 0.005 |
| 4908 | JOE'S VALLEY RESERVOIR | 0.012 | 0.045 | 400.000 | 2.483 | 11.200 | 0.003 |
| 4909 | MINERSVILLE RESERVOIR | 0.192 | 0.060 | 445.000 | 33.583 | 8.600 | 0.107 |
| 4910 | MOON LAKE | 0.008 | 0.040 | 381.000 | 2.700 | 9.600 | 0.002 |
| 4911 | NAVAJO LAKE | 0.016 | 0.040 | 368.000 | 2.000 | 6.000 | 0.003 |
| 4912 | NEWCASTLE RESERVOIR | 0.051 | 0.040 | 428.667 | 12.467 | 13.600 | 0.009 |
| 4913 | OTTER CREEK RESERVOIR | 0.067 | 0.040 | 453.667 | 11.767 | 10.600 | 0.033 |
| 4914 | PANGUITCH LAKE | 0.071 | 0.040 | 426.500 | 45.950 | 14.200 | 0.010 |
| 4915 | PELICAN LAKE | 0.044 | 0.050 | 438.500 | 6.350 | 8.400 | 0.004 |
| 4916 | PINEVIEW RESERVOIR | 0.028 | 0.300 | 435.083 | 5.692 | 14.600 | 0.006 |
| 4917 | PIUTE RESERVOIR | 0.047 | 0.150 | 482.625 | 25.329 | 11.600 | 0.007 |
| 4918 | PORCUPINE RESERVOIR | 0.025 | 0.110 | 440.000 | 7.860 | 12.400 | 0.011 |
| 4919 | PRUESS RESERVOIR (GARRIS | 0.057 | 0.140 | 491.000 | 4.533 | 8.800 | 0.008 |
| 4920 | SEVIER BRIDGE RESERVOIR | 0.026 | 0.355 | 449.778 | 18.222 | 12.400 | 0.008 |
| 4921 | STARVATION RESERVOIR | 0.016 | 0.040 | 394.583 | 5.675 | 13.200 | 0.004 |
| 4922 | STEINAKER RESERVOIR | 0.011 | 0.040 | 316.750 | 1.844 | 12.600 | 0.005 |
| 4923 | TROPIC RESERVOIR | 0.021 | 0.050 | 425.000 | 7.200 | 8.400 | 0.006 |
| 4924 | UTAH LAKE | 0.132 | 0.320 | 490.583 | 72.012 | 11.400 | 0.012 |
| 4925 | WILLARD BAY RESERVOIR | 0.044 | 0.060 | 457.182 | 7.567 | 11.000 | 0.009 |
| [illegible]5 | FLAMING GORGE RESERVOIR | 0.011 | 0.690 | 285.636 | 2.500 | 10.400 | 0.003 |



APPENDICES

ERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

| LAKE CODE | LAKE NAME | MEDIAN TOTAL P | MEDIAN INORG N | 500-MEAN SEC | MEAN CHLORA | 15-MIN DO | MEDIAN DISS ORTHO P | INDEX NO |
|---|---|---|---|---|---|---|---|---|
| 0408 | LAKE POWELL | 96 ( 25) | 4 ( 1) | 81 ( 21) | 73 ( 19) | 15 ( 4) | 42 ( 11) | 311 |
| 4901 | BEAR LAKE | 90 ( 23) | 87 ( 19) | 96 ( 25) | 100 ( 26) | 77 ( 20) | 90 ( 23) | 540 |
| 4902 | LOWER BOWN'S RESERVOIR | 46 ( 12) | 87 ( 19) | 85 ( 22) | 65 ( 17) | 73 ( 19) | 50 ( 13) | 406 |
| 4903 | DEER CREEK RESERVOIR | 42 ( 11) | 19 ( 5) | 42 ( 11) | 35 ( 9) | 0 ( 0) | 58 ( 14) | 196 |
| 4904 | ECHO RESERVOIR | 31 ( 8) | 27 ( 7) | 19 ( 5) | 50 ( 13) | 12 ( 3) | 13 ( 3) | 152 |
| 4905 | LYNN RESERVOIR | 8 ( 2) | 23 ( 6) | 58 ( 15) | 8 ( 2) | 62 ( 15) | 4 ( 1) | 163 |
| 4906 | FISH LAKE | 62 ( 16) | 65 ( 16) | 100 ( 26) | 23 ( 6) | 62 ( 15) | 79 ( 20) | 391 |
| 4907 | HUNTINGTON NORTH RESERVO | 77 ( 20) | 65 ( 16) | 69 ( 18) | 92 ( 24) | 96 ( 25) | 69 ( 18) | 468 |
| 4908 | JOE'S VALLEY RESERVOIR | 81 ( 21) | 58 ( 15) | 62 ( 16) | 85 ( 22) | 46 ( 12) | 96 ( 25) | 428 |
| 4909 | MINERSVILLE RESERVOIR | 0 ( 0) | 44 ( 11) | 27 ( 7) | 12 ( 3) | 85 ( 22) | 0 ( 0) | 168 |
| 4910 | MOON LAKE | 100 ( 26) | 87 ( 19) | 73 ( 19) | 77 ( 20) | 69 ( 18) | 100 ( 26) | 506 |
| 4911 | NAVAJO LAKE | 69 ( 18) | 87 ( 19) | 77 ( 20) | 88 ( 23) | 100 ( 26) | 85 ( 22) | 506 |
| 4912 | NEWCASTLE RESERVOIR | 23 ( 6) | 87 ( 19) | 46 ( 12) | 27 ( 7) | 19 ( 5) | 27 ( 7) | 229 |
| 4913 | OTTER CREEK RESERVOIR | 15 ( 4) | 87 ( 19) | 15 ( 4) | 31 ( 8) | 54 ( 14) | 8 ( 2) | 210 |
| 4914 | PANGUITCH LAKE | 12 ( 3) | 65 ( 16) | 50 ( 13) | 4 ( 1) | 8 ( 2) | 23 ( 6) | 162 |
| 4915 | PELICAN LAKE | 37 ( 9) | 54 ( 14) | 35 ( 9) | 54 ( 14) | 90 ( 23) | 73 ( 19) | 343 |
| 4916 | PINEVIEW RESERVOIR | 50 ( 13) | 15 ( 4) | 38 ( 10) | 58 ( 15) | 4 ( 1) | 58 ( 14) | 223 |
| 4917 | PIUTE RESERVOIR | 27 ( 7) | 31 ( 8) | 8 ( 2) | 15 ( 4) | 38 ( 10) | 46 ( 12) | 165 |
| 4918 | PORCUPINE RESERVOIR | 58 ( 15) | 38 ( 10) | 31 ( 8) | 38 ( 10) | 33 ( 8) | 19 ( 5) | 217 |
| 4919 | PRUESS RESERVOIR (GARRIS | 19 ( 5) | 35 ( 9) | 0 ( 0) | 69 ( 18) | 81 ( 21) | 37 ( 9) | 241 |
| 4920 | SEVIER BRIDGE RESERVOIR | 54 ( 14) | 8 ( 2) | 23 ( 6) | 19 ( 5) | 33 ( 8) | 37 ( 9) | 174 |
| 4921 | STARVATION RESERVOIR | 73 ( 19) | 87 ( 19) | 65 ( 17) | 62 ( 16) | 23 ( 6) | 79 ( 20) | 389 |
| 4922 | STEINAKER RESERVOIR | 85 ( 22) | 87 ( 19) | 88 ( 23) | 96 ( 25) | 27 ( 7) | 65 ( 17) | 448 |
| 4923 | TROPIC RESERVOIR | 65 ( 17) | 50 ( 13) | 54 ( 14) | 46 ( 12) | 90 ( 23) | 58 ( 14) | 363 |
| 4924 | UTAH LAKE | 4 ( 1) | 12 ( 3) | 4 ( 1) | 0 ( 0) | 42 ( 11) | 13 ( 3) | 75 |
| 4925 | WILLARD BAY RESERVOIR | 37 ( 9) | 44 ( 11) | 12 ( 3) | 42 ( 11) | 50 ( 13) | 31 ( 8) | 216 |
| 5605 | FLAMING GORGE RESERVOIR | 90 ( 23) | 0 ( 0) | 92 ( 24) | 81 ( 21) | 62 ( 15) | 90 ( 23) | 415 |

LAKES RANKED BY INDEX NOS.

| RANK | LAKE CODE | LAKE NAME | INDEX NO |
|---|---|---|---|
| 1 | 4901 | BEAR LAKE | 540 |
| 2 | 4911 | NAVAJO LAKE | 506 |
| 3 | 4910 | MOON LAKE | 506 |
| 4 | 4907 | HUNTINGTON NORTH RESERVO | 468 |
| 5 | 4922 | STEINAKER RESERVOIR | 448 |
| 6 | 4908 | JOE'S VALLEY RESERVOIR | 428 |
| 7 | 5605 | FLAMING GORGE RESERVOIR | 415 |
| 8 | 4902 | LOWER BOWN'S RESERVOIR | 406 |
| 9 | 4906 | FISH LAKE | 391 |
| 10 | 4921 | STARVATION RESERVOIR | 389 |
| 11 | 4923 | TROPIC RESERVOIR | 363 |
| 12 | 4915 | PELICAN LAKE | 343 |
| 13 | 0408 | LAKE POWELL | 311 |
| 14 | 4919 | PRUESS RESERVOIR (GARRIS | 241 |
| 15 | 4912 | NEWCASTLE RESERVOIR | 229 |
| 16 | 4916 | PINEVIEW RESERVOIR | 223 |
| 17 | 4918 | PORCUPINE RESERVOIR | 217 |
| 18 | 4925 | WILLARD BAY RESERVOIR | 216 |
| 19 | 4913 | OTTER CREEK RESERVOIR | 210 |
| 20 | 4903 | DEER CREEK RESERVOIR | 196 |
| 21 | 4920 | SEVIER BRIDGE RESERVOIR | 174 |
| 22 | 4909 | MINERSVILLE RESERVOIR | 168 |
| 23 | 4917 | PIUTE RESERVOIR | 165 |
| 24 | 4905 | LYNN RESERVOIR | 163 |
| 25 | 4914 | PANQUITCH LAKE | 162 |
| 26 | 4904 | ECHO RESERVOIR | 152 |
| 27 | 4924 | UTAH LAKE | 75 |

# APPENDIX B

## CONVERSION FACTORS

## CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x $8.107 \times 10^{-4}$ = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

# APPENDIX C

## PHYSICAL and CHEMICAL DATA

491201
37 39 00.0 113 31 00.0 3
NEWCASTLE RESERVOIR
49021 UTAH

11EPALES 760114 2111202
0034 FEET DEPTH CLASS 00

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00610 NH3-N TOTAL MG/L | 00625 TOT KJEL N MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75/05/08 | 14 | 35 0000 | 11.3 | 9.2 | 34 | 624 | 8.60 | 258 | 0.030 | 0.800 | 0.020K | 0.050 |
| | 14 | 35 0005 | 9.9 | 9.2 | | 630 | 8.60 | 258 | 0.020 | 0.300 | 0.020K | 0.043 |
| | 14 | 35 0015 | 9.9 | 9.2 | | 618 | 8.60 | 248 | 0.020K | 0.300 | 0.020K | 0.042 |
| | 14 | 35 0030 | 9.8 | 9.2 | | 613 | 8.60 | 256 | 0.020K | 0.300 | 0.020K | 0.041 |
| 75/08/13 | 08 | 45 0000 | 21.3 | 7.8 | 126 | 574 | 8.60 | 182 | 0.020K | 0.700 | 0.020K | 0.007 |
| | 08 | 45 0005 | 21.3 | 8.2 | | 572 | 8.10 | 186 | 0.040 | 0.700 | 0.020K | 0.012 |
| | 08 | 45 0020 | 20.7 | 1.8 | | 596 | 8.60 | 180 | 0.020K | 0.600 | 0.020K | 0.007 |
| | 08 | 45 0031 | 18.0 | 1.4 | | 495 | 8.00 | 182 | 0.040 | 0.600 | 0.020K | 0.040 |
| 75/09/26 | 13 | 10 0000 | 18.5 | 8.4 | 60 | 536 | 8.50 | 192 | 0.020K | 0.400 | 0.020K | 0.004 |
| | 13 | 10 0005 | 18.2 | 7.6 | | 528 | 8.50 | 194 | 0.020K | 0.400 | 0.020K | 0.002 |
| | 13 | 10 0015 | 18.1 | 7.0 | | 534 | 8.45 | 195 | 0.020K | 0.400 | 0.020K | 0.002 |
| | 13 | 10 0021 | 17.8 | 7.0 | | 538 | 8.50 | 196 | 0.040 | 0.500 | 0.020K | 0.005 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00665 PHOS-TOT MG/L P | 32217 CHLRPHYL A UG/L | 00031 INCDT LT REMNING PERCENT |
|---|---|---|---|---|---|
| 75/05/08 | 14 | 35 0000 | 0.079 | 16.1 | |
| | 14 | 35 0005 | 0.071 | | |
| | 14 | 35 0015 | 0.072 | | |
| | 14 | 35 0030 | 0.073 | | |
| 75/08/13 | 08 | 45 0000 | 0.035 | 5.7 | |
| | 08 | 45 0005 | 0.058 | | |
| | 08 | 45 0020 | 0.034 | | |
| | 08 | 45 0031 | 0.064 | | |
| 75/09/26 | 13 | 10 0000 | 0.039 | 15.6 | |
| | 13 | 10 0005 | 0.042 | | |
| | 13 | 10 0015 | 0.033 | | |
| | 13 | 10 0021 | 0.045 | | |

K VALUE KNOWN TO BE
LESS THAN INDICATED